CONSERVATION OF A 'THREATENED BUTTERFLY COMMUNITY' AT MOUNT PIPER, VICTORIA

ANN JELINEK, DAVID R. BRITTON AND TIM R. NEW

Jelinek, A., Britton, D.R. & New, T.R. 1994 06 30. Conservation of a threatened butterfly community at Mount Piper, Victoria. *Memoirs of the Queensland Museum* 36(1): 115-120. Brisbane. ISSN 0079-8835

Mount Piper is an area of outstanding environmental significance. It is currently the focus of study of a 'threatened Butterfly Community'. Mount Piper has the only known occurrence of 'Butterfly Community No.1' listed under Victoria's Flora and Fauna Guarantee Act, 1988. The butterfly assemblage includes two rare Lycaenidae, *Acrodipsas brisbanensis* and *A. myrmecophila*. A combination of legislation, public involvement, regional planning and sponsorship, supported by State and Commonwealth funding for management and research respectively, have greatly assisted with the understanding and long term conservation of this unique environment. □*Community, Lycaenidae, Acrodipsas, Ant-blue, butterfly, ant, hill-topping, Flora and Fauna Guarantee, Critical Habitat*

Ann Jelinek, c/- Australian Nature Conservation Agency, Endangered Species Unit, GPO Box 636, Canberra, ACT, 2601, Australia; David R. Britton and Tim R. New, Zoology Department, La Trobe University, Victoria, 3083, Australia, 28 July 1993.

Mount Piper is a steep, solitary mountain rising from 230m to 440m above an undulating plain between the Tallarook and Mount William ranges in central Victoria (37°12'S, 145°0'E). The cone-shaped mountain is a distinctive local landmark and natural backdrop for Broadford township where it features on the Shire's logo. The Department of Conservation and Natural Resources manages the Mount Piper Education Reserve of 56 ha. which incorporates most of the mountain.

Mount Piper is a quartz plug or epithermal deposit of quartz and other minerals deposited by hot solutions. The quartz capping at the summit is localised. It is virtually an 'island' of natural bushland surrounded by predominantly cleared agricultural land. Remnant bushland on private land links native vegetation on the mountain with roadside and streamside vegetation, providing important wildlife habitats.

The vegetation on Mount Piper is a mosaic of open forest and woodland dominated by Stringybark, Peppermint, Box and Ironbark eucalypts (Ashton, 1976; Cameron et al., 1992). Scattered clumps of Red Stringybark, *Eucalyptus macrorhyncha* F.Muell. ex Benth. subsp. *macrorhyncha* and small groups of live, partly dead and dead Lightwood, *Acacia implexa* Benth., occur on the summit. Small, naturally grassy patches with lichen-covered boulders and rock outcrops also occur. Total summit area is about 2000m².

Most of Mount Piper is naturally vegetated although there is evidence of past habitat disturbances. These include tree clearing or trimming of sight lines for the trigonometric station and around communication towers on the summit, the construction of a steep access road to a radio shed built just below the summit, selective timber cutting, wood collecting, bushwalking, horse riding, trail bike riding, vehicular access, and the invasion of introduced plants (e.g. *Centaurium* sp.), grasses and thistles, livestock, feral goats and rabbits.

Briefly during the late 1940s, Mount Piper was a source of timber for firing boilers at the local Broadford paper mill. Originally, the mill used black coal but later the mill used timber and then brown coal. Earlier, two underground mine tunnels and a mine shaft were constructed and operated in search of antimony and gold. Antimony was mined from 1939 to 1945 but proved unprofitable (Marshall, 1992, pers. comm.).

Mount Piper is an valuable scientific and educational resource. It is currently a focus for butterfly conservation in Victoria.

SCIENTIFIC SIGNIFICANCE

Mount Piper is recognised for its butterfly diversity and its rare and threatened butterfly species. The attraction of the isolated mountain landscape for hill-topping butterflies and moths makes Mount Piper an important site for monitoring the abundance of significant, hill-topping species. Hill-topping is an effective means of mate location and is an integral part of the life cycles of many butterflies and moths (New, 1991).

Other special features include its interesting

geological formation and distinctive vegetation patterns reflecting changes in aspect and altitude. Mount Piper also provides refuge for various local and migratory native wildlife including koalas (*Phascolarctos cinereus*), rare Regent Honeyeaters (*Xanthomyza phrygia*) and possibly, Brush-tailed Phascogales (*Phascogale tapoatafa*).

In 1989, the introduction of new biodiversity legislation in Victoria, the Flora and Fauna Guarantee Act 1988, and an application for mineral exploration precipitated community interest in Mount Piper. The mountain had previously been popular for recreation and butterfly collecting.

The Flora and Fauna Guarantee Act 1988 aimed to 'guarantee that all taxa of flora and fauna and ecological communities in Victoria can survive, flourish and retain their potential for evolutionary development in the wild'. A community, defined as 'Butterfly Community No. 1', is listed as a threatened community on Schedule 2 of the Act. The butterfly assemblage is characterised by the Small Ant-blue, *Acrodipsas myrmecophila* (Waterhouse and Lyell), Large Ant-blue *Acrodipsas brisbanensis* (Miskin) and Genoveva Azure, *Ogyris genoveva genoveva* (Hewitson). Both *Acrodipsas* species are listed as threatened taxa on Schedule 2 of the Flora and Fauna Guarantee Act 1988. The listed 'Butterfly Community' and taxa are considered to be 'significantly prone to future threats that are likely to result in their extinction, primarily because of their restricted occurrence and sensitivity to environmental conditions'.

The threat of mineral exploration and prospecting on Mount Piper was averted after intense pressure from entomologists, the local community, the Department of Conservation & Natural Resources (then Conservation, Forests & Lands) and Broadford Shire Council. Newspaper headlines declared 'The Minister, Mount Piper and those butterflies!', 'Shire skittles Mount Piper mining', 'Serenity may be a new battleground' and 'Fears that gold search could kill butterflies', thus encouraging a volatile debate. The strong community concern was rekindled recently with another unsuccessful application for mineral exploration, although mineral exploration and mining interests remain.

'BUTTERFLY COMMUNITY'

Mount Piper is the core area of a forest habitat that supports 'Butterfly Community No. 1' which includes at least 38 butterfly species, several large, diurnal moth species and many species of ants (Britton & New, 1993):

- 28 butterfly and 7 large, diurnal moth species have been recorded on the summit of Mount Piper, of those 20 of the butterflies have been recorded only on the summit;
- 18 butterfly and 3 large, diurnal moth species are resident; 8 other butterfly and 4 diurnal moth species are also possibly resident within the habitat;
- 13 butterfly species are associated with various species of ants;
- 5 butterfly species use acacias, 5 use mistletoes and 8 use native grasses and sedges for larval food and breeding sites.

Mount Piper is also the only currently known site of *Acrodipsas myrmecophila* in Victoria. It has unusual associations of butterfly species. In particular, it represents a unique co-occurrence of *A. myrmecophila* and *A. brisbanensis*. It supports the rare, diurnal Sun Moth, *Synemon plana* Walker, associated with native grassland habitats. It also has a high diversity of terrestrial and arboreal ants. About 130 morphospecies have been recorded (S. Hinkley, 1993, pers. comm.).

The Mount Piper habitat is important for at least 23 hill-topping butterfly species and one grassland moth (Britton & New, 1993; Common & Waterhouse, 1981; Crosby, 1988; Quick, 1989) (Table 1).

The isolated, distinctive peak of Mount Piper attracts hill-topping butterflies and moths. Males congregate on the summit where they establish and defend territories. Some also attract females and mate. *Acrodipsas* species establish territories on the upper-most branches of the tallest eucalypt; other species use eucalypts, acacias and rocks or settle on the ground. The trigonometric station is rarely used for hill-topping even though it is one of the highest objects on the summit (Britton & New, 1992, 1993).

Interactions between butterflies, particularly hill-topping species seeking limited territorial sites on the summit, and interdependent relationships between some lycaenid species and ants are common. Insectivorous vertebrates, including Grey Fantails (*Rhipidura fuliginosa*), Short-beaked Echidnas (*Tachyglossus aculeatus*),

TABLE 1. Summary of butterflies and diurnal moths recorded on the summit of Mount Piper.Source: Britton & New 1992, 1993, *C. Beardsell, pers comm. 1993 X = summit only; X + = summit & elsewhere.

BUTTERFLY SPECIES	CONSERVATION (LOCAL & STATE) & BREEDING STATUS	Recorded	
Trapezites phigalioides Waterhouse	common, resident	X	
Trapezites phigalia phigalia (Hewitson)*	common, resident	X	
Trapezites luteus luteus (Tepper)	localised, resident		
Dispar compacta (Butler)	common, resident	X	+
Signeta flammeata (Butler)	sparse, resident	X	
Taractrocera papyria papyria (Boisduval)	common, resident		
Ocybadistes walkeri sothis Waterhouse	sparse, possible resident		
Papilio anactus W.S. Macleay	common, vagrant	X	
Papilio demaleus sthenelus W.S. Macleay	rare, vagrant	X	
Delias aganippe (Donovan)	common, resident	X	+
Delias harpalyce (Donovan)	common, resident	X	+
Anaphaeis java teutonia (Fabricius)	common, vagrant		
Pieris rapae rapae (Linnaeus)	common, vagrant	X	+
Appias paulina ego (Boisduval)	rare, migratory vagrant	X	
Eurema smilax (Donovan)	rare, migratory vagrant		
Geitoneura klugii klugii (Guérin-Méneville)	common, resident	X	+
Heteronympha merope merope (Fabricius)	common, resident	X	+
Vanessa kershawi (McCoy)	common, possible resident	X	+
Vanessa itea (Fabricius)	common, vagrant	X	
Acraea andromacha andromacha (Fabricius)	rare, migratory vagrant	X	
Junonia villida calybe (Godart)	common, resident		
Danaus chrysippus petilia (Stoll)	sparse, vagrant	X	
Acrodipsas brisbanensis cyrilus (Anderson & Spry)	rare, possible resident. FFG listed, Rare (Vic)	X	
Acrodipsas myrmecophila (Waterhouse & Lyell)	rare, possible resident. FFG listed	X	
Hypochrysops delicia delos (Waterhouse & Lyell)	common, possible resident	X	
Ogyris olane ocela Waterhouse	common, resident	X	
Ogyris genoveva genoveva (Hewitson)	rare, possible resident	X	
Ogyris abrota Westwood	localised, resident		
Neolucia agricola agricola (Westwood)	sparse, possible resident	X	
Theclinesthes miskini miskini (T.P. Lucas)	sparse, possible resident	X	
Theclinesthes serpentata serpentata (Herrich-Schäffer)	common, vagrant	X	
Lampides boeticus (Linnaeus)	sparse, vagrant	X	
Zizinia labradus labradus (Godart)	common, resident	X	
Nacaduba biocellata biocellata (Semper)	common, resident	X	
Candalides hyacinthinus simplex (Tepper)	rare, vagrant	X	
Lucia lunbaria Swainson	occasionally common, otherwise sparse, resident		
Jalmenus evagoras evagoras (Donovan)	localised, resident		
Jalmenus icilius Hewitson	rare, resident		
DIURNAL MOTHS			
Comocrus behri (Angus)	common, resident	X	+
Phalaenoides glycine Lewis	common, vagrant	X	+
Eutrichopidia latinus (Donovan)	common, possible resident	X	+
Synemon plana Walker	occasionally common, otherwise sparse, resident		
Nyctemera amica (White)	common, resident	X	
Asura lydia (Donovan)	common, possible resident	X	
Utetheisa pulchelloides Hampson	common, possible resident	X	
Pollanisus viridipulverulenta (Guérin-Méneville)	common, possible resident	X	

Grass Skinks (*Lampropholis guichenoti*), and other fauna may also interact with butterflies, moths or ants.

Butterfly and moth larval food plants or ant nests are likely oviposition sites for butterflies and moths. These include acacias and mistletoes, and ant nests in or on tree stumps, beneath bark or in dead or living, standing and fallen eucalypts and acacias. Native grasslands dominated by *Danthonia* spp. provide important habitats for *Synemon plana*, the larvae of which feed on roots of native grasses. Areas with these characteristics occur mainly on the lower slopes of Mount Piper and on surrounding private land and road reserves (Britton & New, 1993).

Symbiotic relationships between butterflies and ants are common. *Acrodipsas myrmecophila* is believed to associate with the Coconut Ant (*Papyrius 'nitidus'*), *Ogyris genoveva genoveva* with the Sugar Ant (*Camponotus 'consobrinus'*), *Jalmenus icilius* with *Iridomyrmex 'vicina'*, *Lucia limbaria* with *Iridomyrmex* sp. (possibly *I. 'itinerans'*), *Hypochrysops delicia delos* with ants of the genus *Crematogaster* and *Jalmenus evagoras evagoras* with species of the small, aggressive, black ants, *Iridomyrmex* spp. (Britton & New, 1993).

Ants attend the caterpillars of these lycaenids. They guide them to food supplies and protect them from disease, parasites and predators (Britton & New, 1992). The female *A. myrmecophila* oviposits on a stump or tree that contains the nest of *P. 'nitidus'*. The ants take the newly hatched larvae into their nest where the larvae feed on material brought into the nest by the ants or by extracting fluids from ant larvae and pupae. Caterpillars pupate inside the nest from which the adult butterflies later emerge (Common & Waterhouse, 1981; Quick, 1989). The life history of *A. brisbanensis* is unknown. Despite intensive searching for *Papyrius 'nitidus'* on and around Mount Piper, including historical occurrences, roadside reserves and private property, no colonies have been located during the past three years of survey.

Caterpillars of *Jalmenus icilius* and *J. evagoras evagoras* feed on *Acacia pycnantha* and *A. mearnsii* respectively; those of *Ogyris genoveva genoveva* and *O. abrota* feed on Box Mistletoe *Amyema miquelii* and Creeping Mistletoe *Muellerina eucalyptoides* respectively. Larvae of the hill-topping moth, *Comocrus behri* also feed on *A. miquelii*. Both species of acacias and mistletoes occur in the Mount Piper area.

THREATS

The most serious, current threats to the butterfly assemblage at Mount Piper are: high intensity and frequent fire; firewood collecting; intensive grazing, soil compaction and increased soil fertility due to livestock; invasive plants and pest animals have potential to significantly change, deplete or compete for food sources, shelter, butterfly and moth oviposition sites and ant nest sites.

Salinity, chemical sprays, tree dieback, rural subdivisions and vegetation clearance, including active removal of native grasses, sedges, mistletoe, acacia seedlings and old standing or fallen acacias and eucalypts can all directly degrade breeding, feeding and shelter sites for butterflies, moths, ants and associated fauna. They can also indirectly affect the habitat by progressively fragmenting remnant bushland around hill-topping and oviposition sites.

Mineral exploration and mining can cause habitat disturbance and pollution on Mount Piper and in adjoining freehold properties and road reserves.

Intensive visitor use of Mount Piper can cause erosion, inhibit regeneration and cause other habitat disturbance unless carefully managed.

Continued use of the summit as a trigonometric station is a threat but only where vegetation is cleared or hinders rehabilitation works and natural regeneration on and around the summit.

CONSERVATION STRATEGY

The conservation strategy for the Mount Piper environment integrates research, planning and management with community involvement. The strategy recognises community awareness and appreciation about the environmental significance of the butterfly community and its habitat as an integral part of threatened species management and land use planning.

Action Statement No.6 prepared for 'Butterfly Community No. 1' in accordance with the Flora and Fauna Guarantee Act 1988 and a Recovery Plan, Research Phase are currently being implemented (Jelinek, 1991, 1992). These plans concentrate on research and monitoring of the butterflies, day-flying moths and ants at Mount Piper, as well as more detailed studies on selected target species and comparative surveys at other mountain peaks (Britton & New 1992, 1993). Within three years, high priority research and management activities identified in the plans have been completed.

Essential management activities carried out include erosion control and revegetation, restriction of access into the reserve to walkers, removal of disused structures, on-site interpretation, community consultation, removal of livestock and feral goats and hand removal of thistles. The interpretation display and brochure aim to increase community awareness and appreciation of the significance of the Mount Piper environment.

Broadford Shire Council is committed to protecting roadside vegetation in the area from clearing, fire and wood collecting activities. The Geodetic Survey Section of the Department of Survey and Mapping has agreed to minimum site clearance requirements around the trigonometric station required for satellite survey instead of maintaining sight lines for ground survey.

Long term protection of the Mount Piper habitat is also provided by other planning and legislative processes. A 'critical habitat' determination for 'Butterfly Community No.1' is being prepared in accordance with the Flora and Fauna Guarantee Act, 1988. It is based on the known and potential critical habitat requirements of the rare and threatened butterflies and moth recorded for 'Butterfly Community No.1'. Critical habitat is defined as 'the whole or any part or parts of the habitat of the community that is critical to the survival of that community'. Mount Piper forms the core area of the identified 'critical habitat', with the summit being important for hill-topping species and known and potentially important butterfly and moth breeding sites occurring on the lower slopes of Mount Piper, outside Mount Piper Education Reserve.

The Mount Piper habitat, including public and private land, is also on the interim list of the Register of the National Estate based on its significance for invertebrates, particularly butterflies. In addition, a proposed amendment to the Broadford Shire Planning Scheme, known as Amendment L8 (Mount Piper Conservation Zone), reflects the environmental, cultural and scenic significance of the Mount Piper landscape, together with contiguous native or semi-native habitats on private land and road reserves. The policy component of Amendment L8 provides specific controls preventing the removal of native vegetation in all successional stages without a permit. Although statewide native vegetation controls exist, they are inadequate for invertebrate conservation. They do not cover vegetation less than 10 years old, dead standing and fallen trees or in most cases, areas of native vegetation less than 10 hectares.

Prior to the formal exhibition of the proposed Amendment L8 in May 1993, public consultation occurred to clarify the need for the Amendment, its implications for landowners, provide information about the Flora and Fauna Guarantee Act 1988 and discuss the results of management and research work at Mount Piper. The status of Amendment L8 is subject to the recommendations of a Panel Hearing held recently in accordance with the Planning & Environment Act 1987.

Management guidelines, based on the research results, have been developed for managing native and semi-native vegetation on and surrounding Mount Piper for wildlife conservation. These guidelines are included in the L8 Amendment, are actively promoted and are, wherever possible, complemented by joint on-site inspections with landholders. Incentive schemes such as Save the Bush are available to assist landholders with protecting native vegetation remnants.

The guidelines encourage land owners and managers to:

- protect native vegetation remnants;
- maintain community dynamics, especially areas of successional vegetation including acacias and native grasslands, by selective slashing, light grazing or low intensity, infrequent fire;
- promote acacia diversity and native grasslands;
- leave senescent and dead, standing or fallen acacia and eucalypt stems, dead and decaying stumps and leaf litter in native vegetation remnants;
- encourage natural revegetation by fencing out livestock and minimising vehicle use, particularly along water courses and on steep slopes;
- establish strategic plantings of local, native trees and shrubs to connect existing vegetation remnants and provide shelter belts for livestock;
- cease removal of mistletoe and fence areas severely affected by tree dieback and mistletoe to minimise increased fertility and soil compaction due to livestock;
- control invasive plants, particularly blackberries, thistles and pest animals such as goats that degrade native habitats and compete with native fauna;
- participate in the Land for Wildlife Scheme and local Landcare activities.

SUMMARY

The Mount Piper conservation strategy highlights the significance of mountain landscapes for

invertebrate conservation. It also demonstrates the importance of integrated land management based on an understanding of an area's ecology, rather than concentrating on individual species or being restricted by land tenure.

Consecutive seasons of invertebrate surveys, monitoring and research at Mount Piper have provided significant information on the invertebrate community, important species and habitat characteristics. This work is considerably enhanced by comparative butterfly surveys at other potentially important mountain sites. Key environmental features identified include naturally vegetated mountain landscapes, all successional stages of eucalypts and acacias, decaying ground timber, stumps and leaf litter, mistletoes, native grasses and sedges.

Increased community awareness, improved hilltop management, maintenance of vegetation in a range of successional stages and a study of ant species distributions and ecology within the habitat form the basis for future management and conservation of the threatened butterfly species and community at Mount Piper. Understanding relationships between *Acrodipsas* butterflies and ants will also assist recognition of habitat requirements of these rare and threatened species. Continuing active support of local people, interest groups and scientists is also needed to ensure the long term conservation of this unique ecological community.

ACKNOWLEDGMENTS

The authors are grateful for financial assistance provided by the Australian Heritage Commission under the National Estate Grants Program and the Australian Nature Conservation Agency under the Endangered Species Program. These grants have supported the research component of the project. Appreciation is extended to the Australian Geographic Society and the State Government of Victoria for supporting other important components of this project. Thanks also to D. Crosby and W.N.B. Quick for information about butterflies at Mount Piper and the biology of *Acrodipsas myrmecophila*.

LITERATURE CITED

ASHTON, D.H. 1976. The vegetation of Mount Piper, Central Victoria: a study of a continuum. Journal of Ecology 64: 463-483.

BRITTON, D.R. & NEW, T.R 1992. Ecology of the butterfly and ant community at Mount Piper, Victoria. (Unpublished report, Department of Conservation and Natural Resources, Victoria).

1993. Communities of diurnal Lepidoptera in central Victoria, with emphasis on the Mount Piper region, Broadford. (Unpublished report, Department of Conservation and Natural Resources, Victoria).

CAMERON, D., YOUNG, F. & WHITE, M. 1992. Vascular Flora of Mount Piper Education Reserve, Broadford. (Unpublished report, Department of Conservation and Natural Resources, Victoria).

COMMON, I.F.B. & WATERHOUSE, D.F. 1981. Butterflies of Australia. (Angus & Robertson: Sydney).

CROSBY, D.F. 1988. The entomological significance of Mount Piper, Broadford. (Unpublished report, Department of Conservation, Forests and Lands, Victoria).

JELINEK, A. 1991. Butterfly Community No. 1. (Flora and Fauna Guarantee Action Statement No. 6, Department of Conservation and Environment, Victoria).

1992. A Recovery Plan, Research Phase for a threatened butterfly community at Mount Piper in Central Victoria. (Unpublished report, Australian National Parks and Wildlife Service, Canberra).

NEW, T.R. 1991. Butterfly Conservation. (Oxford University Press: Melbourne).

QUICK, W.N.B. 1989. The Victorian 'Ant-blues' - *Acrodipsas* spp. (Lepidoptera: Lycaenidae). (Letter, Department of Conservation, Forests and Lands).